أولاً: الدوال المثلثية و الدوال القطعية

الدالة	مجال التعريف	مجال القيـــم	المشتق	الدالة الأصلية
$sin(x)$	$-\infty < x < +\infty$	$-1 < sin(x) < 1$	$\frac{d}{dx} sin(x) = cos(x)$	$\int sin(x)dx = -cos(x)$
$cos(x)$	$-\infty < x < +\infty$	$-1 < cos(x) < 1$	$\frac{d}{dx} cos(x) = -sin(x)$	$\int cos(x)dx = sin(x)$
$tan(x)$	$x \in \mathbb{R} \setminus \left\{n\pi + \frac{\pi}{2}\right\}$; $n \in \mathbb{Z}$	$-\infty < tan(x) < +\infty$	$\frac{d}{dx} tan(x) = \frac{1}{\cos^2(x)}$	$\int tan(x) = -\ln(\cos(x))$
$cot(x)$	$x \in \mathbb{R} \setminus \{n\pi\}$; $n \in \mathbb{Z}$	$-\infty < cot(x) < +\infty$	$\frac{d}{dx} cot(x) = \frac{-1}{\sin^2(x)}$	$\int cot(x)dx = \ln(sin(x))$
$sinh(x)$ $\{ sh(x) \}$	$-\infty < x < +\infty$	$-\infty < sh(x) < +\infty$	$\frac{d}{dx} sh(x) = ch(x)$	$\int sh(x)dx = ch(x)$
$cosh(x)$	$-\infty < x < +\infty$	$ch(x) \geq 1$	$\frac{d}{dx} ch(x) = sh(x)$	$\int ch(x)dx = sh(x)$
$tanh(x)$	$-\infty < x < +\infty$	$-1 < th(x) < +1$	$\frac{d}{dx} th(x) = \frac{1}{\mathrm{ch}^2(x)}$	$\int th(x)dx = \ln(\mathrm{ch}(x))$
$coth(x)$	$x \in \mathbb{R}^*$	$cth(x) \in \mathbb{R} \setminus [-1,1]$	$\frac{d}{dx} cth(x) = \frac{-1}{\mathrm{sh}^2(x)}$	$\int cth(x)dx = \ln(sh(x))$

ثانياً : الدوال العكسية

الدالة	مجال التعريف	مجال القيـــم	المشتق	الدالة الأصلية
$sin^{-1}(x)$ $\{ ArcSin(x) \}$	$-1 < x < +1$	$-\frac{\pi}{2} < \sin^{-1}(x) < \frac{\pi}{2}$	$\frac{d}{dx}\sin^{-1}(x) = \frac{1}{\sqrt{1-x^2}}$	$\int \sin^{-1}(x)\,dx = \sqrt{1-x^2} + x\sin^{-1}(x)$
$cos^{-1}(x)$	$-1 < x < +1$	$0 < \cos^{-1}(x) < \pi$	$\frac{d}{dx}\cos^{-1}(x) = \frac{-1}{\sqrt{1-x^2}}$	$\int \cos^{-1}(x)\,dx = -\sqrt{1-x^2} + x\cos^{-1}(x)$
$tan^{-1}(x)$	$-\infty < x < +\infty$	$-\frac{\pi}{2} < \tan^{-1}(x) < \frac{\pi}{2}$	$\frac{d}{dx}\tan^{-1}(x) = \frac{1}{x^2+1}$	$\int \tan^{-1}(x)\,dx = -\frac{1}{2}\ln(x^2+1) + x\tan^{-1}(x)$
$cot^{-1}(x)$	$-\infty < x < +\infty$	$-\frac{\pi}{2} < \cot^{-1}(x) < \frac{\pi}{2}$	$\frac{d}{dx}\cot^{-1}(x) = \frac{1}{x^2+1}$	$\int \cot^{-1}(x)\,dx = -\frac{1}{2}\ln(x^2+1) + x\tan^{-1}(x)$
$sinh^{-1}(x)$ $\{ ArcSh(x) \}$	$x \in \mathbb{R}$	$sh^{-1}(x) \in \mathbb{R}$	$\frac{d}{dx}\mathrm{sh}^{-1}(x) = \frac{1}{\sqrt{x^2+1}}$	$\int \sin^{-1}(x)\,dx = -\sqrt{1+x^2} + x\,\mathrm{sh}^{-1}(x)$
$cosh^{-1}(x)$	$x \geq 1$	$Arch(x) \geq 0$	$\frac{d}{dx}\mathrm{ch}^{-1}(x) = \frac{-1}{\sqrt{x^2-1}}$	$\int \mathrm{ch}^{-1}(x)\,dx = -\sqrt{x^2-1} + x\,\mathrm{ch}^{-1}(x)$
$tanh^{-1}(x)$	$-1 < x < +1$	$-\infty < \mathrm{th}^{-1}(x) < +\infty$	$\frac{d}{dx}\mathrm{th}^{-1}(x) = \frac{1}{1-x^2}$	$\int \mathrm{th}^{-1}(x)\,dx = \frac{1}{2}\ln(1-x^2) + x\,\mathrm{th}^{-1}(x)$
$coth^{-1}(x)$	$x \in \mathbb{R}\backslash\{1\}$	$cth^{-1} \in \mathbb{R}\backslash\{0\}$	$\frac{d}{dx}\mathrm{cth}^{-1}(x) = \frac{1}{1-x^2}$	$\int \cot^{-1}(x)\,dx = \frac{1}{2}\ln(1-x^2) + x\,\mathrm{cth}^{-1}(x)$

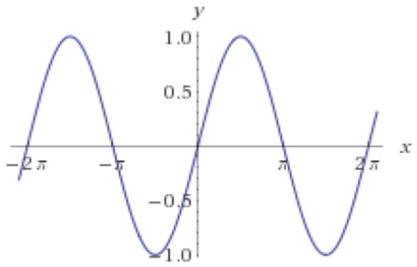
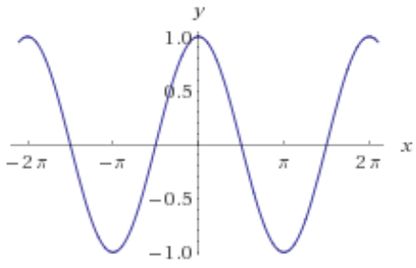
- **ملاحظة :**

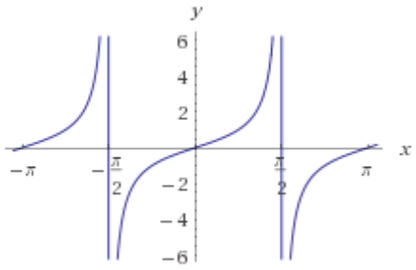
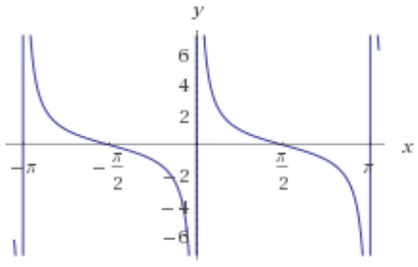
$$\sin^{-1}(x) = \text{Arcsin}(x)$$

$$[\,\text{Sin}(x)\,]^{-1} = \frac{1}{\sin(x)} = \csc(x)$$

$$[\,\text{Cos}(x)\,]^{-1} = \frac{1}{\cos(x)} = \sec(x)$$

- فيما يلي بعض خصائص هذه الدوال وخطها البياني :

Sin(x)	Cos(x)	
		الخط البياني
$\frac{e^{ix} - e^{-ix}}{2i}$	$\frac{e^{ix} + e^{-ix}}{2}$	الصيغة العقدية
$x = n\pi \; ; n \in \mathbb{Z}$	$x = n\pi + \frac{\pi}{2} \; ; n \in \mathbb{Z}$	الجذور
$Sin\,(x) = 2\sin\left(\frac{x}{2}\right)\cos\left(\frac{x}{2}\right)$ $2\,Sin^2(x) = 1 - \cos(2x)$ $Sin\,(x + \pi) = -\sin(x)$ $Sin(x) = \cos\left(\frac{\pi}{2} - x\right) = -cos(\frac{\pi}{2} + x)$	$\cos(x) = 2\cos^2\left(\frac{x}{2}\right) - 1 = 1 + 2\sin^2\left(\frac{x}{2}\right)$ $\cos(x) = \cos^2\left(\frac{x}{2}\right) - \sin^2\left(\frac{x}{2}\right)$ $2\cos^2(x) = 1 + \cos(2x)$ $\cos^2(x) = \frac{1}{1 + \tan^2(x)}$ $Cos\,(x + \pi) = -\cos(x)$ $Cos\,(x) = \sin\left(\frac{\pi}{2} - x\right) = \sin\left(\frac{\pi}{2} + x\right)$	تحويلات
$\sum_{n=0}^{\infty}(-1)^n \frac{x^{2n+1}}{(2n+1)!}$	$\sum_{n=0}^{\infty}(-1)^n \frac{x^{2n}}{(2n)!}$	النشر
دالة فردية $\sin(-x) = -\sin(x)$	**دالة زوجية** $\cos(-x) = \cos(x)$	خصائص

Tan(x)	Cot(x)	
		الخط البياني
$x = n\pi \; ; n \in \mathbb{Z}$	$x = n\pi + \frac{\pi}{2} \; ; n \in \mathbb{Z}$	الجذور
$tan\,(x) = tan(n\pi + x)$ $tan(x) = \frac{sin(2x)}{1 + cos(2x)}$ $tan(x) = cot\left(\frac{\pi}{2} - x\right)$ $\tan\left(x + \frac{\pi}{4}\right) = \frac{1 + \ tan(x)}{1 - tan(x)}$ $\tan(2x) = \frac{2\ tan(x)}{1 - tan^2(x)}$ $\tan\left(\frac{x}{2}\right) = \frac{\sin(x)}{1 + \cos(x)}$ $\tan(x + y) = \frac{\tan(x) + \tan(y)}{1 - \tan(x)\ \tan(y)}$ $\tan(x - y) = \frac{\tan(x) - \tan(y)}{1 + \tan(x)\ \tan(y)}$	$cot\,(x) = cot(n\pi + x)$ $cot(x) = \frac{sin(2x)}{1 - cos(2x)}$ $cot(x) = tan\left(\frac{\pi}{2} - x\right)$ $\cot(x) = \frac{1}{2}\left(\cot\left(\frac{x}{2}\right) - \tan\left(\frac{x}{2}\right)\right)$	تحويلات
دالة فردية $\tan(-x) = \ -\tan(x)$	دالة فردية $\cot(-x) = -\cot(x)$	خصائص

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